

**CLEAN COPY****We Claim:**

1. A multi-tenant system comprising:  
a server apparatus on which a virtual machine with  
tenant identification data given operates;

5 a plurality of switches, each of which comprises a  
processing section which processes a packet based on a flow  
entry set to said switch; and

a controller configured to set the flow entry to each  
of said plurality of switches,

10 wherein said plurality of switches includes a first  
switch connected with said server apparatus and a second switch  
connected with an equipment whose tenant identification data  
cannot be recognized,

wherein said controller comprises a flow entry  
15 setting section configured to set to said first switch, the flow  
entry which prescribes an operation of encapsulating a packet  
which is transmitted from said virtual machine on said server  
apparatus, by adding addition data which includes the tenant  
identification data, and set to said second switch, the flow  
20 entry which prescribes a decapsulating operation of removing  
the addition data from the encapsulated packet, and

wherein said second switch comprises:

an address translating section configured to  
translate a source address of the decapsulated packet by said  
25 processing section, into an IP address managed by said second  
switch; and

a transfer processing section configured to transfer  
the packet, whose source address has been translated, for said  
equipment.

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2. The multi-tenant system according to claim 1, wherein  
said controller carries out packet-out of a packet-out message  
which includes the packet and the tenant identification data  
of the packet, and

35 wherein said processing section of said first switch  
encapsulates the packet based on the packet-out message.

3. The multi-tenant system according to claim 1, wherein said second switch stores in said address translation table, an IP address of said first switch, a IP address of said virtual  
5 machine as a transmission source and the tenant identification data which are contained in the encapsulated packet when the encapsulated packet is received,

wherein said flow entry setting section of said controller sets to said second switch, the flow entry which  
10 prescribes the operation of encapsulating the packet transmitted from said equipment by adding the addition data containing the tenant identification data, and sets to said first switch, the flow entry which prescribes the decapsulating operation of removing the addition data from the encapsulated  
15 packet,

wherein said transfer processing section of said second switch receives a reply packet transmitted to said virtual machine from said equipment,

wherein said address translating section of said  
20 second switch translates a destination IP address of the reply packet into the IP address of said virtual machine based on said address translation table,

wherein said the processing section of said second switch encapsulates the reply packet subjected to the  
25 translation of the source IP address, to the encapsulated reply packet in which the addition data containing the tenant identification data of said virtual machine has been added, wherein an IP address of said first switch of said address translation table is set as a destination IP address of an L3  
30 header of the addition data,

wherein said processing section of said first switch decapsulates the encapsulated replay packet by removing the addition data from the encapsulated reply packet, and

wherein said transfer processing section of said  
35 first switch transmits the decapsulated reply packet to said virtual machine.

4. The multi-tenant system according to claim 1, wherein said address translating section of said second switch translates a source port number of the packet into a port number managed by said second switch and translates a destination port number of the reply packet into a source port number before the translation.
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5. The controller which is used in the multi-tenant system according to any of claims 1 to 4.
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6. The switch which is used in the multi-tenant system according to any of claims 1 to 4.
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7. A packet transferring method in a multi-tenant system, comprising:
- transmitting a packet from a virtual machine (VM) to an equipment whose tenant identification data cannot be recognized;
  - 20 carrying out packet-in of the packet into a controller by a first switch;
  - calculating an out-bound route of the packet by said controller;
  - setting flow entries for packet transfer into
  - 25 switches on the out-bound route by said controller;
  - wherein said setting comprises setting to the first switch, a flow entry which prescribes an operation of encapsulating the packet by adding addition data which contains tenant identification data of said virtual machine (VM) to the
  - 30 packets, and setting in said second switch, a flow entry which prescribes a decapsulating operation of removing the addition data from the encapsulated packet;
  - encapsulating, by said first switch, the packet based on the set flow entry by adding the addition data which contains
  - 35 the tenant identification data of said virtual machine (VM);

receiving the encapsulated packet by said second switch;

removing by said second switch, the addition data from the encapsulated packet based on the flow entry set in said  
5 second switch;

translating a transmission IP address of the decapsulated packet from which the addition data has been removed into an IP address managed by said second switch based on an address translation table; and

10 transmitting the translated packet to said equipment by said second switch.

8. The packet transferring method according to claim 7, further comprising:

15 carrying out packet-out of a packet-out message which contains the packet and the tenant identification data of the said packet by said controller.

9. The packet transferring method according to claim 7, further comprising:

20 recording in the address translation table by said second switch which has received the encapsulated packet, an IP address of said first switch, an IP address of a source virtual machine (VM), and the tenant identification data which are  
25 contained in the encapsulated packet;

transmitting a reply packet from said equipment to said virtual machine (VM);

30 translating a destination IP address into the IP address of said source virtual machine (VM) based on the address translation table by said second switch;

encapsulating the reply packet by adding the addition data which contains the tenant identification data of said virtual machine (VM) by said second switch to produce an encapsulated reply packet;

setting the IP address of said first switch to the address translation table as a destination IP address of an L3 header in the addition data;

5 carrying out packet-in of the encapsulated reply packet into said controller by said second switch;

calculating an in-bound route of the encapsulated reply packet by said controller;

10 setting to the switches on the in-bound route, the flow entries for transferring the encapsulated reply packet by said controller;

wherein setting a flow entry which prescribes an operation of removing the addition data, to said first switch;

carrying out packet-out of the encapsulated reply packet to said second switch by said controller;

15 transmitting the encapsulated reply packet to said first switch from said second switch;

receiving the encapsulated reply packet by said first switch;

20 removing the addition data based on the flow entry by said first switch to produce a decapsulated replay packet; and

transmitting the decapsulated reply packet to said virtual machine (VM) by said first switch.

25 10. The packet transferring method according to any of claims 7 to 9, wherein said encapsulating the packet comprises encapsulating the packet in which a source port number of the packet is translated into a port number managed by said second switch; and

30 wherein said encapsulating the reply packet comprises encapsulating the reply packet in which a destination port number of the reply packet into a source port number before the translation.